

CLAIMS

1. A conditioning apparatus for use in a chemical mechanical planarization (CMP) system, comprising:

a conditioning substrate;

5 a holder configured to hold the conditioning substrate;

a shaft connected to the holder;

rotation mechanics capable of rotating the shaft causing the holder and the conditioning substrate to be rotated with the shaft; and

10 oscillation mechanics capable of moving a position of the shaft within a region defined by a peripheral boundary that is less than and within an outer periphery of the conditioning substrate.

2. A conditioning apparatus for use in a CMP system as recited in claim 1, wherein the oscillation mechanics are configured to move the position of the shaft in a
15 specific pattern within the region defined by the peripheral boundary.

3. A conditioning apparatus for use in a CMP system as recited in claim 2, wherein the specific pattern is represented as one of an orbital oscillation pattern and a linear oscillation pattern.

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4. A conditioning apparatus for use in a CMP system as recited in claim 1, wherein the oscillation mechanics are configured to move the position of the shaft in a random pattern within the region defined by the peripheral boundary.

5. A conditioning apparatus for use in a CMP system as recited in claim 1, wherein the peripheral boundary is a circular boundary defined by a radius that is less than ten percent of a radius defining the outer periphery of the conditioning substrate.

5 6. A conditioning apparatus for use in a CMP system as recited in claim 1, further comprising:

a positioning arm configured to engage the shaft, the positioning arm capable of sweeping the conditioning substrate over a working surface of a CMP pad in tandem with operation of the rotation mechanics and the oscillation mechanics.

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7. A method for conditioning a pad used to perform a chemical mechanical planarization (CMP) process, comprising:

rotating a conditioning substrate about a centroid of the conditioning substrate;

applying the conditioning substrate to a moving CMP pad; and

15 oscillating the conditioning substrate about the centroid of the conditioning substrate, the oscillating being performed simultaneously with the rotating of the conditioning substrate.

8. A method for conditioning a pad used to perform a CMP process as recited
20 in claim 7, wherein the oscillating causes the conditioning substrate to be moved in a specific pattern about the centroid of the conditioning substrate.

9. A method for conditioning a pad used to perform a CMP process as recited in claim 8, wherein the specific pattern is represented as one of an orbital oscillation pattern and a linear oscillation pattern.

5 10. A method for conditioning a pad used to perform a CMP process as recited in claim 7, wherein the oscillating causes the conditioning substrate to be moved in a random pattern about the centroid of the conditioning substrate.

10 11. A method for conditioning a pad used to perform a CMP process as recited in claim 7, wherein the oscillating is constrained within a peripheral boundary that is less than and within an outer periphery of the conditioning substrate.

12. A method for conditioning a pad used to perform a CMP process as recited in claim 7, further comprising:
15 sweeping the conditioning substrate over the moving CMP pad in tandem with rotating the conditioning substrate and oscillating the conditioning substrate.

13. A conditioning apparatus for use in a chemical mechanical planarization (CMP) system, comprising:
20 a conditioning substrate having an active side and a backside; and
a conditioning substrate backing defining a differential pressure distribution capable of being applied to the backside of the conditioning substrate.

14. A conditioning apparatus for use in a CMP system as recited in claim 13,
wherein the conditioning substrate backing is configured as a fluid conditioning substrate
backing, the fluid conditioning substrate backing being defined by a number of fluid
chambers, each of the number of fluid chambers capable of applying a specific pressure to
5 the backside of the conditioning substrate.

15. A conditioning apparatus for use in a CMP system as recited in claim 14,
wherein the fluid conditioning substrate backing is configured to allow the differential
pressure distribution to be controlled during a CMP process.
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16. A conditioning apparatus for use in a CMP system as recited in claim 13,
wherein the conditioning substrate backing is configured as a solid conditioning substrate
backing, the solid conditioning substrate backing being defined by a number of material
regions being differentiated by spring constant values, each of the number of material
15 regions capable of applying a specific pressure to the backside of the conditioning
substrate.

17. A conditioning apparatus for use in a CMP system as recited in claim 13,
wherein the conditioning substrate is configured to transfer the differential pressure
20 distribution from the backside of the conditioning substrate to the active side of the
conditioning substrate.

18. A conditioning apparatus for use in a CMP system as recited in claim 13,
further comprising:

a holder configured to receive and hold both the conditioning substrate backing and the conditioning substrate;

a shaft being connected to the holder; and

rotation mechanics capable of rotating the shaft causing the holder, the conditioning
5 substrate backing, and the conditioning substrate to be rotated with the shaft.

19. A method for conditioning a pad used to perform a chemical mechanical planarization (CMP) process, comprising:

rotating a conditioning substrate;

10 establishing a differential pressure distribution over a surface of the conditioning substrate; and

applying the conditioning substrate surface having the differential pressure distribution to a moving CMP pad.

15 20. A method for conditioning a pad used to perform a CMP process as recited in claim 19, further comprising:

controlling the differential pressure distribution during the CMP process.

21. A method for conditioning a pad used to perform a CMP process as recited
20 in claim 19, wherein establishing the differential pressure distribution is performed by providing one of a fluid conditioning substrate backing and a solid conditioning substrate backing in contact with the conditioning substrate.

22. A method for conditioning a pad used to perform a CMP process as recited in claim 19, further comprising:

sweeping the conditioning substrate having the differential pressure distribution over the moving CMP pad in tandem with rotating the conditioning substrate.

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